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**The PhaseChip: Manipulating Phase Diagrams with Microfluidics**

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X-ray diffraction of protein crystals reveals protein structure, which is needed to advance fundamental understanding of protein function and for drug development. Currently the physical process of crystallization is the bottleneck in protein structure determination. The PhaseChip is a microfluidic device that can precisely meter, mix, and store nanoliter volumes of sample, solvent, and other reagents. Thousands of nanoliter drops of different protein solutions are stored in individual wells on chip. Through the controlled kinetic manipulation of the solution chemical potential the process of nucleation and growth can be decoupled, which is crucial for optimizing protein crystallization. Movies illustrating the PhaseChip in action: <http://www.elsie.brandeis.edu/>